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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
NELSON, ALECIA DIANE	
ART UNIT	**PAPER NUMBER**
2675	

DATE MAILED: 01/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/775,368	Applicant(s) STEWART ET AL.	
	Examiner Alecia D. Nelson	Art Unit 2675	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 September 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *9/10/04,10/18/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(x), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. ***Claims 1-20*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Zilles et al. (U.S. Patent No. 6,111,577).

With reference to **claims 1, 3, 4, 6, 7, 11, 12, and 15-17**, Zilles teaches a method and apparatus for determining forces to be applied -to a user through a haptic interface, wherein in one embodiment the step of generating a representation of an object in graphic space includes defining the object as a mesh of planar surfaces and associating surface condition values to each of the nodes defining the planar surfaces. In another embodiment, the step of generating a representation of an object in graphic space includes describing the surface of the object using a coordinate system and associating surface condition values with each set of coordinates of the coordinate system (see abstract). The computer system, includes a processor, a user input device and a display device

(see column 18, lines 45-56), generating a computer generated geometric model of the virtual object (see column 4, lines 15-26), and a haptic interface operatively in communication with the computer system, wherein the haptic interface includes a haptic device for transmitting information between a user and the geometric model (see column 6, lines 3-22), and wherein a haptic device position and orientation are acquired with respect to a surface of the geometric model (column 15, lines 60-64), and mapped into a geometric model coordinate reference system (see column 17, lines 30-38), a closest point position and orientation on the surface of the geometric model to the haptic device position is determined (see column 17, lines 39-50), a surface property at the closest point position and orientation is extracted (see column 17, line 60-column 18, line 5), and a property-feedback force is determined and applied to the haptic device to the hand of the user in relation to the surface of the geometric model (see column 18, lines 43-47).

Zilles fails to specifically teach that the system includes a memory, however it would be inherent that a computer system has a memory device. Furthermore, in a system as taught by Zilles it would be necessary for there to be a memory device to store the haptic sensations, geometric representations of the real object, software programs, algorithms for calculating force, and the coordinate system. Even though Zilles et al. fails to specifically teach generating a stick-to-surface force, there is disclosure teaching the application of different surface "feels", as well as the usage of a stiffening force applied on a virtual object surface (see column 6, lines 44-68). Furthermore, with the proper usage of

detecting the haptic interface point in graphic space in combination with algorithms, or impedance control techniques carried out by the haptic rendering application it would be obvious to one skilled in the art to generate a stick-to-surface force, just as any other surface force or "feel", i.e., smoothing, bumps, concaved, solid, flexible.

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to allow the device of Zilles to include the memory device as explained above, and have the ability to generate a stick-to-surface force in order to provide a haptic interface system which provides touch interfaces which accurately replicate the touch sensations a user would experience in the real world and thereby allowing the virtual object to "feel" more realistic.

With reference to **claims 2, 13, 14 and 20**, Zilles teaches the usage of a display (150) wherein the object is represented in graphic space and describes a virtual environment using a coordinate system (see column 17, lines 30-32).

With reference to **claim 5**, Zilles fails to teach the usage of a memory, however it would be inherent for such a device to include a memory as explained above with reference to **claim 1**. Zilles further teaches that CAD software is used to generate the representation of the object (see column 4, lines 313-35). After generation a representation of the object in graphic space (step 10), the sensors

of the haptic interface system sense the position of the user in real space (step 12).

With reference to **claims 8, 9, 10, 18, and 19**, it is taught that one of many types of planar surface and shapes can be used in forming the virtual object (see column 15, lines 40-56), which would allow for determining a surface curvature at the closest point position and orientation. It is also taught determining a surface normal (see column 16, lines 56-62). Further it is taught that after defining the positions of nodes (A-C) on the planar surface, the interpolation scheme is used for converting the detected position into a vector (see column 16, lines 18-25).

Response to Arguments

3. Applicant's arguments filed 09/20/04 have been fully considered but they are not persuasive. It is argued that Zilles et al. does not disclose a haptic device for transmitting information between a user and a geometric model wherein a haptic device position and orientation are acquired with respect to a surface of the geometric model and mapped into a geometric model coordinate reference system. However, Zilles et al. teaches that the haptic rendering application describes the real world object using a coordinate system (see column 5, lines 58-59), wherein the application has generated a representation of an object in graphic space and the haptic interface device senses the position of the user in real space. After the haptic interface device has sensed the position of the user in real space, the information regarding the position of the user is relayed to the

haptic rendering application. The haptic rendering application uses the position of the user in real space to determine the location of the haptic interface point in graphic space. As the user changes position, the haptic interface device senses this change in position and the haptic rendering application updates the location of the haptic interface point in graphic space to reflect the change of the user's position in teal space (see column 6, lines 3-22). It is argued that Zilles et al. does not disclose a closest point position and orientation on the surface of the geometric model to the haptic device position is determined, and a surface property of the geometric model at the closest point position and orientation is extracted. However, Zilles et al. teaches that the closest point position and orientation on the surface of the geometric model to the haptic device position is determined by usage of the coordinate system of the virtual environment defined by the haptic rendering application. The haptic rendering application describes a planar surface (130) of the virtual object using a rectangular coordinate system, which can be mapped into the (x, y, z) coordinate system. With reference to the surface property of the geometric model at the closest point position and orientation, which is extracted, Zilles et al. teaches a texture map to be applied to the planar surface defined by a third coordinate system having u and v axes, wherein the texture map represents the texture to be assigned to the planar surface. A series of transformation equations maps the coordinates (s, t) of the planar surface to the equivalent coordinates (u, v) of the texture map (see column 17, line 30-column 18-line 39). It is also argued that Zilles et al. fails to teach a stick-to-surface force and a property-feedback force are determined and

applied to the haptic device to constrain a hand of a user to the surface of the geometric model. However, as explained above, even though Zilles et al. fails to specifically teach generating a stick-to-surface feel for constraining the users hand to the surface of the virtual object it would be obvious to one having ordinary skill in the art to generate such a surface feel by usage of algorithms in the haptic rendering application. It is well known in the art generating barrier forces, stiffening forces, resistive forces, magnetic forces, or the like all of which could result in providing a feedback "feeling" of constraining the hand of the user to a surface or within an area being displayed. In a virtual environment wherein a barrier force is applied it prevents the users hand from passing, a certain surface or area thereby constraining the hand of the user within an area being displayed; a stiffening force or a resistive force applied in a virtual environment the movement of the haptic device is stiff and restrictive, or resisting movement of the users hand within the area of the virtual environment in which the force is applied; a magnetic force applied in a virtual environment will provide a magnetic force between the virtual representation of the haptic device and a virtual surface which would also simulate a force constraining the virtual representation of the haptic device to the virtual surface. Therefore the rejection to the **claims 1-20** will be maintained.

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alecia D. Nelson whose telephone number is

(703) 305-0143. The examiner can normally be reached on Monday-Friday 9:30-6:00. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

adn/ADN
June 1, 2004

AMR A. AWAD
PRIMARY EXAMINER